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EXAMINER	
WEST, JEFFREY R	
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2857	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/921,293	Applicant(s) CLARKE ET AL.	
	Examiner Jeffrey R. West	Art Unit 2857	

-- The MAILING DATE of this communication appears on th cover sheet with the correspondence address --

Period f r Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 July 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8 and 10-27* is/are rejected.

7)☒ Claim(s) *9* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 September 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *5* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Drawings

1. The drawing in Figure 1 is objected to because it does not have sufficiently descriptive labels. Blank boxes in drawings should be labeled descriptively unless it is a well-known component.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: "2328". A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities:

On page 20, line 29, "PLL2" is incorrectly labeled "1216" instead of "1214" as it is labeled on page 20, line 28, and in Figure 12.

On page 26, line 21 and page 28, line 8, the "prefilter" is incorrectly labeled "1512" instead of "1514" as it is labeled on page 24, line 11, and in Figure 15.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claim 23 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 23 recites, "providing the output signal of the first PLL to the second PLL as an initial condition frequency of the second PLL to assist lock-in by the second PLL." The instant specification fails to provide adequate support for this limitation. The specification only mentions this step on page 5, lines 7-8 which is a restatement of the claim language and provides no further information on how to carry out the invention. Therefore, it is unclear to one having ordinary skill in the art what the "initial condition frequency" is and how the output of the first PLL provides this "initial condition frequency." This omission makes it unclear how to use the invetion as claimed.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 19 and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 19 recites, "a filter operable to filter the flow sensor signal prior to the processing by the slow PLL." This limitation is vague and indefinite because there is no mention of a "slow PLL" in the respective parent claims.

Claim 20 is rejected under 35 U.S.C. 112, second paragraph, because it incorporates the faulty language present in parent claim 19.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> **(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.**

9. Claims 1, 3-5, 8 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,463,612 to Thompson in view of U.S. Patent No. 6,466,069 to Rozenblit et al. and further in view of U.S. Patent No. 4,446,744 to Bearcroft.

Thompson discloses an electronic circuit using digital techniques for vortex shedding flowmeter signal processing comprising a vortex flow sensor (i.e. process variable transmitter) that produces a signal over a line, which varies with the vortex shedding frequency, to a preamplifier, and then over an A.C. coupling to a phase detector (column 2, lines 63-66). Thompson discloses a phase lock loop (column 3, lines 1-4) comprising a phase detector that receives the input signal and produces an output signal to a low-pass

loop filter that outputs a filtered signal to a voltage controlled oscillator that feeds-back a locking oscillator signal to the phase detector (Figure 1). Thompson also discloses including the components of the system on a single low-power digital signal processor chip used for use in a software process (column 3, lines 39-43 and 61-62). Thompson discloses including an amplitude detector (i.e. drop out detector) that senses the amplitude of the input signal and generates a low flow signal when it is below a predetermined level (column 2, lines 13-19).

Thompson, however, only discloses using one phase locked loop and therefore also fails to disclose a switching means for selectively connecting first or second phase lock loops based on bandwidth characteristics.

Rozenblit teaches a fast settling charge pump biasing circuit that varies the bias when a phase lock loop changes frequency to improve the settling time of the phase locked loop (abstract). Rozenblit specifies that the phase locked loop include a phase detector, loop filter, and voltage controlled oscillator, wherein the voltage controlled oscillator feeds back the oscillator signal to the phase detector (Figure 1). Rozenblit also teaches changing the locking frequency of the phase locked loop between a narrow bandwidth, small natural frequency, to provide greater immunity to noise, and a larger bandwidth, large natural frequency, to provide faster locking (column 7, line 54 to column 8, line 1). Rozenblit also teaches performing this frequency change based upon a determination that the phase locked loop is locked (column 4, lines 28-32).

Bearcroft teaches an ultrasonic flowmeter that receives flow signals from transmitting transducers (column 1, lines 60-65) that are output to a plurality of filters and then to phase detectors and voltage controlled oscillators (column 2, lines 1-10) forming two phase locked loops with outputs that can be selectively switched (column 2, lines 55-58).

It would have been obvious to one having ordinary skill in the art to modify the invention of Thompson to include selecting between different bandwidth characteristics of a phase locked loop, as taught by Rozenblit, because Thompson teaches that vortex sensors are known to produce noise or fluctuating signals (column 1, lines 21-28) and Rozenblit suggests that the combination would have allowed optimization of the phase locked loop speed while reducing/providing immunity to noise and therefore providing an overall stable phase locked loop (column 8, line 1-19).

It would have been obvious to one having ordinary skill in the art to modify the invention of Thompson and Rozenblit to include two phase locked loops rather than just one loop with varying frequencies, as taught by Bearcroft, because the combination would have provided a faster, simpler, method for switching between two different frequency phase locked loop responses and, as suggested by Bearcroft, removed drift effects as well as operated under conditions of rapid changes of density, temperature, and pressure (column 2, lines 55-66).

Although not specifically disclosed, it would have been obvious to one having ordinary skill in the art to allow the user to have more control over the

sensing process by specifying that the predetermined low-flow amplitude limit be user-controlled.

10. Claims 14-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thompson in view of Rozenblit and Bearcroft and further in view of U.S. Patent No. 5,576,497 to Vignos et al.

As noted above, Thompson in combination with Rozenblit and Bearcroft teaches all of the features of the claimed invention except for specifying that the vortex flow sensor sense pressure variations due to vortex shedding of a fluid in a passage, converting the pressure variations to a sinusoidal signal, or pre-filtering the signal processing.

Vignos teaches adaptive filtering for a vortex flowmeter including a well known vortex sensor that produces an analog sinusoidal signal representative of the alternating differential pressure various to calculate fluid flow or velocity (column 2, lines 44-49). Vignos also teaches an initial signal conditioner which filters the signal before subsequent processing occurs (column 2, lines 49-57). Vignos also teaches that the pre-filtering is switched on and off based upon high or low flow signals obtained in accordance with filter cut-off frequencies (column 6, lines 25-37).

It would have been obvious to one having ordinary skill in the art to modify the invention of Thompson, Rozenblit, and Bearcroft to include specifying that the vortex flow sensor sense pressure variations due to vortex shedding of a fluid in a passage and converting the pressure variations to a sinusoidal

signal, as taught by Vignos, because Thompson in combination with Rozenblit and Bearcroft teaches the processing method, not the specifics of the sensor itself, and Vignos teaches the well known features of a vortex sensor.

Further, It would have been obvious to one having ordinary skill in the art to modify the invention of Thompson, Rozenblit, and Bearcroft to include pre-filtering the signal before processing, as taught by Vignos, because, as suggested by Vignos, the combination would have provided a method for conditioning the signal to obtain a desired bandwidth around the vortex frequency and therefore preserved a high signal-to-noise ratio which produces a more accurate flow measurement over a wider variety of flow conditions (column 2, lines 58-67)

11. Claims 2, 21, 22, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thompson in view of Rozenblit and Bearcroft and further in view of U.S. Patent No. 6,236,278 to Olgaard.

As noted above, Thompson in combination with Rozenblit and Bearcroft teaches all the features of the claimed invention except for including a lock indicator signal indicating when the phase locked loop is locked

Olgaard teaches an apparatus and method for a fast locking phase locked loop comprising a control circuit that, in accordance with a lock signal, and reference and feedback signal frequency divider circuits, transitions between first and second circuit operation modes when, the PLL lock signal indicates

that the PLL has transitioned between unlocked and phase locked states of operation (column 5, lines 41-48).

It would have been obvious to one having ordinary skill in the art to modify the invention of Thompson, Rozenblit, and Bearcroft to include lock indicator signal indicating when the phase locked loop is locked, as taught by Olgaard, because Olgaard suggest that by providing a lock signal in a dual mode PLL circuit (column 5, lines 55-58), the combination would have quickly indicated that the PLL is locked and therefore allowed sooner processing, by implementing processing as soon as the signal is received (column 1, lines 20-26 and column 6, lines 11-22).

Further, since the invention of Thompson, Rozenblit, and Bearcroft teaches switching between the first and second phase locked loops when it is determined that the loop is locked and Olgaard teaches generating a lock indicator signal when the loop is locked, the combination would have provided a method for switching between the two phase locked loops based upon the occurrence of a lock indicator signal.

With respect to claim 24, since the invention of Thompson, Rozenblit, Bearcroft, and Olgaard teaches switching to a first PLL when it is determined that the first PLL is locked, this method is considered to be functionally equivalent to the non-critical step of switching from a second PLL to a first PLL when it is determine that the second PLL is unlocked.

12. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Thompson in view of Rozenblit and Bearcroft and further in view of U.S. Patent No. 6,298,100 to Bouillet.

As noted above, Thompson in combination with Rozenblit and Bearcroft teaches all the features of the claimed invention except for specifying that the phase detectors comprise a heterodyning module and a Hilbert transformer.

Bouillet teaches a phase error estimation method for a demodulator comprising a phase locked loop with a pilot component as a reference and a conventional phase detector for phase acquisition, all part of a phase control loop (column 3, lines 13-17). Bouillet also teaches including a Hilbert filter for receiving the pilot signal, transforming the signal into in-phase and quadrature components, and applying the transformed components to the phase control loop (column 3, lines 31-46). Bouillet also teaches heterodyning the reference pilot with the carrier in the main path of the phase locked loop (column 4, lines 15-30).

It would have been obvious to one having ordinary skill in the art to modify the invention of Thompson, Rozenblit, and Bearcroft to include specifying that the phase detectors comprise a heterodyning module and a Hilbert transformer, as taught by Bouillet, because, as suggested by Bouillet, the combination would have reduced distortion errors by heterodyning the received spectrum of the phase locked loop down to a baseband (column 4, lines 15-22) as well as produced a phase control signal by correlating received sync values with a Hilbert transform of a reference sync value (column 3, lines 61-65).

13. Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thompson in view of Rozenblit and Bearcroft and further in view of U.S. Patent No. 5,570,300 to Henry et al.

As noted above, Thompson in combination with Rozenblit and Bearcroft teaches all the features of the claimed invention except for specifying that the transmitter include a module for generating uncertainty parameters including a status variable.

Henry teaches self-validating sensors that include a transducer for generating a data signal related to the value of a variable and a transmitter for receiving the data signal and generating output signals, wherein the transmitter generates a first output signal related to the value of the variable and a second output based on a dynamic uncertainty analysis of the first output signal (abstract). Henry also teaches that the uncertainty parameters include a measurement status variable (column 2, lines 17-20) indicating quality (column 7, lines 60-63).

It would have been obvious to one having ordinary skill in the art to modify the invention of Thompson, Rozenblit, and Bearcroft to include specifying that the transmitter include a module for generating uncertainty parameters including a status variable, as taught by Henry, because, as suggested by Henry, the combination would have allowed the user of the sensors to obtain an accuracy measurement of the sensor data since sensors do not perfectly represent the value of a process variable obtained, and often includes effects,

such as faults or distortion, resulting from the sensor itself (column 1, lines 20-26).

14. Claims 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thompson in view of Rozenblit, Bearcroft, and Olgaard and further in view of U.S. Patent No. 5,570,300 to Henry et al.

As noted above, Thompson in combination with Rozenblit, Bearcroft, and Olgaard teaches all the features of the claimed invention except for specifying that the transmitter include a module for generating uncertainty parameters including a status variable.

Henry teaches self-validating sensors that include a transducer for generating a data signal related to the value of a variable and a transmitter for receiving the data signal and generating output signals, wherein the transmitter generates a first output signal related to the value of the variable and a second output based on a dynamic uncertainty analysis of the first output signal (abstract). Henry also teaches that the uncertainty parameters include a measurement status variable (column 2, lines 17-20) indicating quality (column 7, lines 60-63).

It would have been obvious to one having ordinary skill in the art to modify the invention of Thompson, Rozenblit, Bearcroft, and Olgaard to include specifying that the transmitter include a module for generating uncertainty parameters including a status variable, as taught by Henry, because, as suggested by Henry, the combination would have allowed the user of the

sensors to obtain an accuracy measurement of the sensor data since sensors do not perfectly represent the value of a process variable obtained, and often includes effects, such as faults or distortion, resulting from the sensor itself (column 1, lines 20-26).

Further, with respect to claim 26, since the measurements of uncertainly would only be sought-after when the PLL's are in their desired operation, it would have been obvious to one having ordinary skill in the art to specify generating the uncertainty parameters only when the respective PLL's are locked, as indicated by the lock signals.

Claim Objections

15. Claim 9 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

U.S. Patent No. 5,551,307 to Kane et al. teaches a mass flow measuring device including a PLL with a frequency selected to increase immunity to noise.

U.S. Patent No. 6,211,742 to Tan et al. teaches a lock detector for phase locked loops.

U.S. Patent No. 4,185,498 to Watson et al. teaches a flowmeter including two phase locked loops.

U.S. Patent No. 4,270,391 to Herzl teaches a frequency-responsive filter for flowmeter transmission systems including a PLL with two comparators causing two different modes of operation.

JP Patent No. 08-075516 to Kobayashi teaches a phase locked loop and ultrasonic flowmeter including a charge pump circuit.

JP Patent No. 11-274922 to Kanayama teaches a phase-locked loop circuit with high speed phase synchronization locking.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey R. West whose telephone number is (703)308-1309. The examiner can normally be reached on Monday through Friday, 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S. Hoff can be reached on (703)308-1677. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7382 for regular communications and (703)308-7382 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

jrw
April 6, 2003

MARC S. HOFF
SUPERVISORY PATENT EXAMINER
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